

CLAIMS

1. A method of determining a paging period between possible paging occasions for a mobile station (300) in a cellular communication system (1) comprising a core network (CN) (100) and a radio access network (RAN) (200), said method comprising the steps of:

- providing a paging parameter of a CN associated parameter set;
- mapping said paging parameter of said CN associated parameter set to a paging parameter of a RAN associated parameter set; and
- determining said paging period based on said paging parameter of said RAN associated parameter set.

2. The method according to claim 1, wherein a time length of said paging period is similar to a time length of a paging period determined by said paging parameter of said CN associated parameter set.

3. The method according to claim 1, wherein said mapping is performed according to:

$$\text{paging parameter of said RAN parameter set} = 3 \times 2^{(9 - \text{paging parameter of said CN parameter set})}$$

4. The method according to claim 1, wherein a paging period (420) determined by a paging parameter of said RAN associated parameter set is an integer multiple of a shorter paging period (400; 410) determined by a larger paging parameter of said RAN associated parameter set.

5. The method according to claim 1, wherein said core network (100) comprises a circuit-switched (CS) core network domain (110) and a packet-switched (PS) core network domain (120), said CS core network domain (110) is associated with a CS paging parameter of said RAN associated parameter set and said PS core network domain (120) is associated with a PS paging parameter of said CN associated parameter set, said method comprises the further step of:

- said radio access network (200) broadcasting said CS paging parameter of said RAN associated parameter set.

6. The method according to claim 1, wherein said core network (100) comprises a circuit-switched (CS) core network domain (110) and a packet-switched (PS) core network domain (120), said CS core network domain (110) is associated with a CS paging parameter of said CN associated parameter set and said PS core network domain (120) is associated with a PS paging parameter of said CN associated parameter set, said method comprises the further steps of:

- 10 - said radio access network (200) mapping said CS paging parameter of said CN associated parameter set to a CS paging parameter of said RAN associated parameter set; and
- said radio access network (200) broadcasting said CS paging parameter of said RAN associated parameter set.

15 7. The method according to claim 5 or 6, wherein said mobile station (300) and said PS core network domain (120) negotiating said PS paging parameter of said CN parameter set.

20 8. The method according to claim 5 or 6, wherein method further comprises the steps of:

- said radio access network (200) mapping said PS paging parameter of said CN associated parameter set to a PS paging parameter of said RAN associated parameter set; and
- said radio access network (200) broadcasting said PS paging parameter of said RAN associated parameter set.

25 9. The method according to claim 5 or 6, wherein said PS paging parameter of said CN associated parameter set is specified in standard.

30 10. The method according to claim 5 or 6, wherein said PS paging parameter of said CN associated parameter set is stored in an identity module (390) associated with said mobile station (300).

11. The method according to claim 5 or 6, wherein said method comprises the further step of:

- a mobile station (300) in idle mode attached to said CS core network domain (110) determining said paging period based on said CS paging parameter of said RAN associated parameter set.

5 12. The method according to any of the claims 5 to 6, wherein said method comprises the further steps of:

- 10 - a mobile station (300) in idle mode attached to said PS core network domain (120) mapping said PS paging parameter of said CN associated parameter set to a PS paging parameter of said RAN parameter set; and
- said mobile station (300) determining said paging period based on said PS paging parameter of said RAN associated parameter set.

15 13. The method according to any of the claims 5 to 6, wherein said method comprises the further steps of:

- 20 - a mobile station (300) in idle mode attached to said CS core network domain (110) and said PS core network domain (120) mapping said PS paging parameter of said CN associated parameter set to a PS paging parameter of said RAN parameter set;
- said mobile station (300) comparing said CS and PS paging parameter of said RAN associated parameter set; and
- said mobile station (300) determining said paging period based on the largest of said compared CS and PS paging parameter of said RAN associated parameter set.

25 14. The method according to claim 5 or 6, wherein said radio access network (200) broadcasting a RAN paging parameter of said RAN associated parameter set.

30 15. The method according to claim 5 or 6, wherein said radio access network (200) including a RAN paging parameter of said RAN associated parameter set in a cell update confirm, a GRA (GERAN Registration Area) update confirm, a

radio bearer reconfiguration, a radio bearer release, a radio bearer setup and/or a RRC (Radio Resource Control) connection setup message to said mobile station (300).

5 16. The method according to claim 5 or 6, wherein said mobile station (300) and said radio access network (200) negotiating a RAN paging parameter of said RAN associated parameter set.

10 17. The method according to any of the claims 14 to 16, wherein said method comprises the further steps of:

- a mobile station (300) in connected mode attached to said CS core network domain (110) comparing said RAN and CS paging parameter of said RAN associated parameter set; and

15 - said mobile station (300) determining said paging period based on the largest of said compared RAN and CS paging parameter of said RAN associated parameter set.

18. The method according to any of the claims 14 to 16, wherein said method comprises the further steps of:

20 - a mobile station (300) in connected mode attached to said PS core network domain (120) mapping said PS paging parameter of said CN associated parameter set to a PS paging parameter of said RAN associated parameter set;

25 - said mobile station (300) comparing said RAN and PS paging parameter of said RAN associated parameter set; and

- said mobile station (300) determining said paging period based on the largest of said compared RAN and PS paging parameter of said RAN associated parameter set.

30 19. The method according to any of the claims 14 to 16, wherein said method comprises the further steps of:

- a mobile station (300) in connected mode attached to said CS core network domain (110) and said PS core network domain (120) mapping said

PS paging parameter of said CN associated parameter set to a PS paging parameter of said RAN parameter set;

- said mobile station (300) comparing said RAN, CS and PS paging parameter of said RAN associated parameter set; and

5 - said mobile station (300) determining said paging period based on the largest of said compared CS, RAN and PS paging parameter of said RAN associated parameter set.

10 20. The method according to claim 1, wherein said PS paging parameter of said CN associated parameter set is included by said mobile station (300) in a GPRS attach request message and/or a routing area update message to said core network (100).

15 21. A cellular communication system (1) for determining a paging period between possible paging occasions for a mobile station (300), said system (1) comprising a radio access network (RAN) (200) and a core network (CN) (200), which core network (100) comprises means for providing a paging parameter of a CN associated parameter set, wherein said system (1) comprises:

20 - means for mapping (210; 310) said paging parameter of said CN associated parameter set to a paging parameter of a RAN associated parameter set; and

- means for determining (260; 360) said paging period based on said paging parameter of said RAN associated parameter set.

25 22. The system according to claim 21, wherein a time length of said paging period is similar to a time length of a paging period determined by said paging parameter of said CN associated parameter set.

30 23. The system according to claim 21, wherein said mapping means (210; 310) is configured to calculate said paging parameter of said RAN associated parameter set according to:

$$\text{paging parameter of said RAN parameter set} = 3 \times 2^{(9 - \text{paging parameter of said CN parameter set})}$$

24. The system according to claim 21, wherein a paging period (420) determined by a paging parameter of said RAN associated parameter set is an integer multiple of a shorter paging period (400; 410) determined by a larger paging parameter of said RAN associated parameter set.

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25. The system according to claim 21, wherein said core network (100) comprises a circuit-switched (CS) core network domain (110) and a packet-switched (PS) core network domain (120), said CS core network domain (110) is associated with a CS paging parameter of said RAN associated parameter set and said PS core network domain (120) is associated with a PS paging parameter of said CN associated parameter set, whereby said radio access network (200) comprises means for broadcasting said CS paging parameter of said RAN associated parameter set.

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26. The system according to claim 21, wherein said core network (100) comprises a circuit-switched (CS) core network domain (110) and a packet-switched (PS) core network domain (120), said CS core network domain (110) is associated with a CS paging parameter of said CN associated parameter set and said PS core network domain (120) is associated with a PS paging parameter of said CN associated parameter set, whereby said mapping means (210; 310) is configured for mapping said CS paging parameter of said CN associated parameter set to a CS paging parameter of said RAN associated parameter set and said radio access network (200) comprises means for broadcasting said CS paging parameter of said RAN associated parameter set.

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27. The system according to claim 25 or 26, wherein said determining means (370) is implemented in a mobile station (300) in idle mode attached to said CS core network domain (110) for determining said paging period based on said CS paging parameter of said RAN associated parameter set.

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28. The system according to any of the claims 25 to 26, wherein said mapping means (310) is provided in a mobile station (300) in idle mode attached to said PS core network domain (120) and is adapted for mapping

said PS paging parameter of said CN associated parameter set to a PS paging parameter of said RAN parameter set and said determining means (360) is implemented in said mobile station (300) for determining said paging period based on said PS paging parameter of said RAN associated parameter set.

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29. The system according to any of the claims 25 to 26, wherein said mapping means (310) is provided in a mobile station (300) in idle mode attached to said CS core network domain (110) and said PS core network domain (120) and is adapted for mapping said PS paging parameter of said CN associated parameter set to a PS paging parameter of said RAN parameter set, and said mobile station (300) comprises means for comparing (350) said CS and PS paging parameter, whereby said determining means (360) is implemented in said mobile station (300) for determining said paging period based on the largest of said compared CS and PS paging parameter of said RAN associated parameter set.

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30. The system according to any of the claims 25 to 26, wherein said radio access network (200) is associated with a radio RAN parameter of said RAN associated parameter set.

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31. The system according to any of the claims 30, wherein a mobile station (300) in connected mode attached to said CS core network domain (110) comprises means for comparing (350) said RAN and CS paging parameter of said RAN associated parameter set, whereby said determining means (360) is implemented in said mobile station for determining said paging parameter based on the largest of said compared RAN and CS paging parameter of said RAN associated parameter set.

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32. The system according to any of the claims 30, wherein said mapping means (310) is provided in a mobile station (300) in connected mode attached to said PS core network domain (120) and is adapted for mapping said PS paging parameter of said CN associated parameter set to a PS paging parameter of said RAN parameter set, and said mobile station (300) comprises

means for comparing (350) said RAN and PS paging parameter of said RAN associated parameter set, whereby said determining means (310) is implemented in said mobile station (300) for determining said paging period based on the largest of said RAN and PS paging parameter of said RAN associated parameter set.

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33. The system according to any of the claims 30, wherein said mapping means (310) is provided in a mobile station (300) in connected mode attached to said CS core network domain (110) and said PS core network domain (120) and is adapted for mapping said PS paging parameter of said CN associated parameter set to a PS paging parameter of said RAN parameter set, and said mobile station (300) comprises means for comparing (350) said RAN, CS and PS paging parameter of said RAN associated parameter set, whereby said determining means (310) is implemented in said mobile station (300) for determining said paging period based on the largest of said CS, RAN and PS paging parameter of said RAN associated parameter set.

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34. The system according to claim 21, wherein said core network (100) is a UMTS (Universal Mobile Telecommunications System) core network and said radio access network (200) is a GERAN (Global system for mobile communication Enhanced data rates for global evolution Radio Access Network) radio access network operating in Iu mode.

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35. A radio access network (RAN) (200) for determining a paging period between possible paging occasions for a mobile station (300) in cellular communication system (1) comprising said radio access network (200) and a core network (CN) (100), which core network (100) comprises means for providing a paging parameter of a CN associated parameter set, wherein said radio access network (200) comprises:

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means for mapping (210) said paging parameter of said CN associated parameter set to a paging parameter of a RAN associated parameter set; and

- means for determining (260) said paging period based on said paging parameter of said RAN associated parameter set.

5 36. The network according to claim 35, wherein a time length of said paging period is similar to a time length of a paging period determined by said paging parameter of said CN associated parameter set.

10 37. The network according to claim 35, wherein said mapping means (210) is configured to calculate said paging parameter of said RAN associated parameter set according to:

$$\text{paging parameter of said RAN parameter set} = 3 \times 2^{(9 - \text{paging parameter of said CN parameter set})}$$

15 38. The network according to claim 35, wherein a paging period (420) determined by a paging parameter of said RAN associated parameter set is an integer multiple of a shorter paging period (400; 410) determined by a larger paging parameter of said RAN associated parameter set.

20 39. The network according to claim 35, wherein said core network (100) comprises a circuit-switched (CS) core network domain (110) and a packet-switched (PS) core network domain (120), said CS core network domain (110) is associated with a CS paging parameter of said RAN associated parameter set and said PS core network domain (120) is associated with a PS paging parameter of said CN associated parameter set, whereby said radio access network (200) comprises means for broadcasting said CS paging parameter of said RAN associated parameter set.

25 40. The network according to claim 35, wherein said core network (100) comprises a circuit-switched (CS) core network domain (110) and a packet-switched (PS) core network domain (120), said CS core network domain (110) is associated with a CS paging parameter of said CN associated parameter set and said PS core network domain (120) is associated with a PS paging parameter of said CN associated parameter set, whereby said mapping means (210) is configured for mapping said CS paging parameter of said CN

associated parameter set to a CS paging parameter of said RAN associated parameter set and said radio access network (200) comprises means for broadcasting said CS paging parameter of said RAN associated parameter set.

5 41. The network according to claim 39 or 40, wherein said mapping means (210) is configured to map said PS paging parameter of said CN associated parameter set to a PS paging parameter of said RAN associated parameter set and said radio access network (200) comprises means for broadcasting said PS paging parameter of said RAN associated parameter set.

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42. The network according to claim 39 or 40, wherein said radio access network (200) comprises means for receiving a paging parameter transmitted in a paging request from a core network domain (110; 120) to which said mobile station (300) is attached, whereby said mapping means (210) is configured to map a received paging parameter of said CN associated parameter set to a corresponding paging parameter of said RAN associated parameter set.

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43. The network according to claim 42, wherein said radio access network (200) comprises means for comparing (250) said paging parameter of said RAN associated parameter set associated with a core network domain (110; 120) to which a mobile station (300) in idle mode is attached and said paging parameter of said RAN associated parameter set associated with said paging request message, whereby said determining means (260) is implemented for determining said paging period based on the largest of said compared paging parameters of said RAN associated parameter set.

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44. The network according to claim 42, wherein said radio access network (200) comprises means for comparing (250) said paging parameter of said RAN associated parameter set associated with a core network domain (110; 120) to which a mobile station (300) in idle mode is attached and said paging parameter of said RAN associated parameter set associated with said paging request message, whereby said determining means (260) is implemented for

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determining said paging period based on the smallest of said compared paging parameters of said RAN associated parameter set.

5 45. The network according to claim 42, wherein said radio access network (200) comprises means for broadcasting a radio RAN parameter of said RAN associated parameter set.

10 46. The network according to claim 42, wherein said radio access network (200) comprises means for including (260) a RAN paging parameter of said RAN associated parameter set in a cell update confirm, a GRA (GERAN Registration Area) update confirm, a radio bearer reconfiguration, a radio bearer release, a radio bearer setup and/or a RRC connection setup message to said mobile station (300).

15 47. The network according to claim 42, wherein said radio access network (200) comprises means for negotiating (230) a RAN paging parameter of said RAN associated parameter set with said mobile station (230).

20 48. The network according to any of the claims 45 to 47, wherein said radio access network (200) comprises means for comparing (250) said paging parameter of said RAN associated parameter set associated with a core network domain (110; 120) to which a mobile station (300) in idle mode is attached, said paging parameter of said RAN associated parameter set associated with said paging request message and said RAN paging parameter of said RAN associated parameter set, whereby said determining means (270) is implemented for determining said paging period based on the largest of said compared paging parameters of said RAN associated parameter set.

25 49. The network according to any of the claims 45 to 47, wherein said radio access network (200) comprises means for comparing (250) said paging parameter of said RAN associated parameter set associated with a core network domain (110; 120) to which a mobile station (300) in idle mode is attached, said paging parameter of said RAN associated parameter set

associated with said paging request message and said RAN paging parameter of said RAN associated parameter set, whereby said determining means (270) is implemented for determining said paging period based on the smallest of said compared paging parameters of said RAN associated parameter set.

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50. A mobile station (300) for determining a paging period between possible paging occasions in a cellular communication system (1) comprising a radio access network (RAN) (200) and a core network (CN) (100), which core network (100) comprises means for providing a paging parameter of a CN associated parameter set, wherein said mobile station (300) comprises:

- means for mapping (310) said paging parameter of said CN associated parameter set to a paging parameter of a RAN associated parameter set; and
- means for determining (360) said paging period based on said paging parameter of said RAN associated parameter set.

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51. The mobile station according to claim 50, wherein a time length of said paging period is similar to a time length of a paging period determined by said paging parameter of said CN associated parameter set.

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52. The mobile station according to claim 50, wherein said mapping means (310) is configured to calculate said paging parameter of said RAN associated parameter set according to:

$$\text{paging parameter of said RAN parameter set} = 3 \times 2^{(9 - \text{paging parameter of said CN parameter set})}$$

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53. The mobile station according to claim 50, wherein a paging period (420) determined by a paging parameter of said RAN associated parameter set is an integer multiple of a shorter paging period (400; 410) determined by a larger paging parameter of said RAN associated parameter set.

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54. The mobile station according to claim 50, wherein said core network (100) comprises a circuit-switched (CS) core network domain (110) and a packet-switched (PS) core network domain (120), said CS core network domain (110)

is associated with a CS paging parameter and said PS core network domain (120) is associated with a PS paging parameter of said CN associated parameter set, whereby said mobile station (300) comprises means for receiving (380) a CS paging parameter of said RAN associated parameter set broadcast from said radio access network (200).

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55. The mobile station according to claim 54, wherein said mobile station (300) comprises means for negotiating (330) said PS paging parameter of said CN associated parameter set with said PS core network domain (110) and said mapping means (310) is configured to map said PS paging parameter of said CN associated parameter set to a PS paging parameter of said RAN associated parameter set.

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56. The mobile station according to claim 54, wherein said PS paging parameter of said CN associated parameter set is stored in an identity module (390) associated with said mobile station (300) and said mapping means (310) is configured to map said PS paging parameter of said CN associated parameter set to a PS paging parameter of said RAN associated parameter set.

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57. The mobile station according to claim 54, wherein said PS paging parameter of said CN associated parameter set is specified in standard and said mapping means (310) is configured to map said PS paging parameter of said CN associated parameter set to a PS paging parameter of said RAN associated parameter set.

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58. The mobile station according to any of the claims 55 to 57, wherein said mobile station (300) is in idle mode and comprises means for selecting (355) the largest of said paging parameters of said RAN associated parameter set associated with a core network domain (110; 120) to which said mobile station (300) is attached, whereby said determining means (360) is implemented for determining said paging period based on said largest paging parameter of said RAN associated parameter set.

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59. The mobile station according to any of the claims 55 to 57, wherein said mobile station (300) comprises means for negotiating (330) a RAN paging parameter of said RAN associated parameter set with said radio access network (200).

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60. The mobile station according to any of the claims 59, wherein said mobile station (300) is in connected mode and comprises means for selecting (355) the largest of said paging parameters of said RAN associated parameter set associated with a core network domain (110; 120) to which said mobile station (300) is attached and said RAN paging parameter of said RAN associated parameter set, whereby said determining means (360) is implemented for determining said paging period based on said selected largest paging parameter of said RAN associated parameter set.

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61. The mobile station according to claim 50, wherein said mobile station (300) comprises means for including (370) said paging parameter of said CN associated parameter set in a GPRS Attach Request message and/or a Routing Area Update message to said core network.

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